RESOURCES

Some findings and conjectures from
recent research into resource development and use

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Mere change without conservation is a passage from nothing to nothing . . . Mere conservation without change cannot conserve.—ALFRED NORTH WHITEHEAD

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A QUESTION OF TIMING

THE STORAGE DAM, leveling out some of the wasteful highs and inadequate lows of natural stream flow, is the heart of most large-scale water development. The timing of construction of such a dam often has much to do with its value to people. Because the earlier stages of control are the more easily won, the first dam in a river basin almost always gives more benefits per acre-foot of storage—whether in terms of flood protection or dependable year-round flow for power generation or irrigation—than the second to be built, even if it is an identical structure; the second more than the third; and so on.

Although well known, this principle has had little influence on the planning of water development in the United States, John V. Krutilla of the RFF research staff points out in his recent study, *Sequence and Timing in River Basin Development.* "Instead," he writes, "the practice appears to be to visualize the development of a river basin at some fixed point in the future, and to prorate the estimated benefits of the block of additional storage projected for that time."

This has been true also, he believes, of joint U.S.-Canadian planning for the Columbia River Basin, at least up to the time he got his manuscript ready for publication a few months ago. International planning for the Columbia, which he analyzes carefully by way of example, is described as having proceeded "without close attention to the sequence of project additions to the system . . . By disregarding the order in which projects are to be brought in, and by comparing only total system benefits with total system costs, the relative costs and benefits of individual projects are lost."

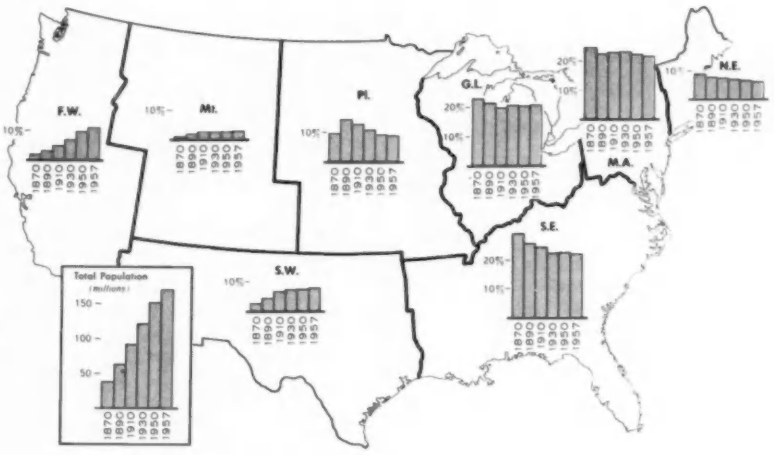
Krutilla's study shows that from the standpoint of further developing the whole Columbia basin, the proposed Libby dam in Montana would be the most economically efficient "next-added" installation among possible sites in the United States part of the basin. (He did not consider Nez Perce, which he characterizes as an even more attractive site from the standpoint of economical storage, because no one has yet worked out a way to build a dam there with-

out barring large runs of salmon from their spawning place.)

Krutilla goes on to say, however, that the storage possibilities of two proposed sites in Canada—Arrow Lakes and Mica Creek—make either of them clearly superior to Libby as candidates for next-added. Other things being equal, they would give power users and taxpayers on both sides of the border more for their money.

These conclusions, he points out, relate only to economic efficiency as estimated from currently available information. Beyond this, "there are large questions of future value of storage and of the sharing of hydroelectric power [between Canada and the United States] that are left unanswered by this analysis. . . . Much remains to be done." Nevertheless, he concludes that "the advantages of considering the sequence of development are clear," and that such a method "is essential to intelligent longer-term planning and to safeguarding the separate interests of the two nations involved." Krutilla's report, with its implication that more homework should be done before the future development of the Columbia is finally charted, has already stirred up considerable interest on both sides of the border.

The whole problem is right now under active negotiation between the two countries. The International Joint Commission since 1944 has been working on a long-range program for the basin. The next step—that of working out specific plans for construction and sharing of costs and benefits—is in the hands of a team of special negotiators from each country, who meet periodically in either Washington or Ottawa.



Regional distribution of population by decades 1870-1950, and 1957

"Westward the Course . . ."

ALL SIGNS AND OMENS are grist for the mill of the social scientist who seeks to trace and account for the pace and sweep of regional change throughout this country.

The moves of the Braves baseball club from Boston to Milwaukee, of the Dodgers from Brooklyn to Los Angeles, and the Giants from New York to San Francisco have been noted as signalling some of the great regional changes under way in this country. To paraphrase Bishop Berkeley, "Westward the course of umpire takes its way."

In his preface to a study that he and three associates have just completed [see New RFF Studies, in this issue], Harvey Perloff writes that the reshuffle points up "two of the most significant shifts which have been taking place in recent decades—the particularly rapid industrial growth of the western end of the Manufacturing Belt, and the virtual flood of movement to the Far West and particularly California."

In analyzing events of the past eighty years, the authors recognize that nationwide forces have dominated economic developments in all parts of the country and that the trend has been persistently upward. Still, they point out, some areas have grown much faster than others and often along quite different lines. Nearly all of the "depressed areas," for instance, have experienced some absolute growth; their problems come from having been left behind relatively in the general advance, normally coupled with an inadequate adjustment in one or a very small number of industries. In other areas most of the problems come from growing so fast.

The whole story of regional variations since 1870 is enormously complex. Parts of the total picture are as remarkable for stability as for speed of relative shifts. In 1900, the great northeastern Manufacturing Belt that stretches from southern New England to Wisconsin had 49 per cent of the nation's population. In 1957, it had 46 per cent. A large part of economic growth of the West and South has been based on primary natural resources. Much of the remainder of the expansion in those regions has consisted in the same activities that are important elsewhere—a process of filling in the manufacturing and service activity "gaps" across the face of the country.

Many forces are at work in the shifting pattern. On the up side, sometimes it is access to raw materials that has played a leading part, as with the newborn petrochemical

industry of the Gulf states; sometimes the impact of growing urban markets, as on the West Coast; sometimes the attraction of ocean beaches and sunshine, as in Florida. On both the up and down sides, the direct impact of technology has often been a strong force, as with cotton farming. Mechanization came belatedly to the Cotton South, but when at length, between the two World Wars, large-scale motorized cotton pickers came into play, the march of the machines drew cotton production away from small hill farms of the Southeast on to the broad and nearly level stretches of the Southwest and into the irrigated valleys of California. As a result, hundreds of thousands of field hands were compelled to look for work in other regions.

The researchers have arrived at a number of observations and conclusions, some of which run counter to widely held beliefs about area development.

FOR INSTANCE:

1. Sheer volume, whether of population or economic activity, is not always the best measure of an area's well-being. The level of per capita income is important, too. "Every region in the country cannot hope to experience rapid increase in the volume of economic activities and in population. But every region can hope to enjoy a high and rising level of per capita income . . . if it is willing to face up to the need for a relative 'emptying out' when the overall situation with regard to relative advantages among regions calls for it."

2. Growth of total income and population has been associated in a general way with declines in the relative importance of agricultural employment and increases in employment in manufacturing and services. Thus "it is true that certain industries are more conducive to regional growth than others." But some regions that lack relative advantages of access to raw materials and markets can expect to grow only on the basis of the industries for which they do have special advantages. "The attraction of industry is a competitive matter." It is pointed out, for example, that "certain types of farming have had rapid and large increases in labor productivity and the areas where these types of farming are located enjoy relatively high levels of per capita income."

3. "Growth industries — those that are expanding in employment or value-added at a rate exceeding the average for all industries— favorably influence growth in the volume of economic activities within a region. But a region may grow by gathering in a greater and greater proportion of the slower-growth industries. . . . Regions that are worrying about decline can learn some useful lessons from the flourishing firms in generally declining industries."

METROPOLITAN AREAS are growing fast and so are their problems. In the next twenty years we expect to see U.S. metropolitanites increase in number by about 55 millions. Some staggering tasks of finance and adjustment are awaiting local governments. . . .

In financing public education, fire protection, police protection and the like, neither growth alone nor the consolidation of existing governments appears likely to have significant effects on per capita expenditures. . . .

Services from a multipurpose single plant, such as water and sewage services, will tend to reduce per capita expenditures only in the first stages of growth. . . .

Efficiency considerations, thus, do not warrant across-the-board consolidation. . . . Consolidation of water and sewage services, preferably into a multipurpose district, can be a move toward greater efficiency and lower expenses. Otherwise, efficiency may be highest in medium sized communities of 50,000 to 100,000 residents.— *Werner Z. Hirsch, in* The Review of Economics and Statistics, *August, 1959.*

TREES, SOIL, AND TIME

IN THE QUARTER-CENTURY since cotton began its march west, pine has become a main hope and reliance over much of the Piedmont. But if pine is further to replace cotton as a cash crop in that part of the Old South, there is still plenty to worry about. One is littleleaf disease, caused by a fungus that kills fine roots; deprived of nutrients, an infected tree dies of slow starvation.

On the lands of the de la Howe School in South Carolina is a 100-acre tract where trees find sanctuary from littleleaf. The old-growth pines on the de la Howe tract are of full size and healthy at 160 years or more, although the fungus is present there, too. Why?

The answer seems to lie in the condition of the soil which is vastly different from that of the abandoned worn-out fields of the area.

"The topsoil has not been lost through erosion," Louis J. Metz of the Southeastern Forest Experiment Station writes for a forthcoming issue of the *Journal of Forestry*. "The soil is porous, mellow, and deep—and the proper habitat is provided for organisms that act against *P.cinnamoni* [the offending fungus] to hold it in check. . . . This natural area helps admirably in demonstrating the conditions under which the littleleaf disease does and does not develop."

Or, as Hugh Bennett has said, regarding the washed-out slopes in his native parts of North Carolina, "Trees know more about taking care of land than men do. They shield the soil and then lay down a mulch."

Nowhere else in the South Carolina Piedmont, and in few other places throughout the Southeast, can such long-undisturbed forest areas be found. These particular 100 acres owe their survival to the

foresight of Dr. John de la Howe, who in endowing the school not long after the Revolutionary War directed in his will that 1,000 acres "shall forever remain in wood or forest." On at least part of this land his wish has been respected; there has been almost no cutting since 1797.

The Society of American Foresters with the assistance of a grant from Resources for the Future is working to locate a number of such representative tracts of virgin or old growth woodland in the Southeast that will be useful for basic research in silviculture, forest management, and ecology. Francis H. Eyre, who is making the field investigations, reports that the de la Howe lands will be among those recommended by the Society for permanent preservation as natural areas.

Land for Cities

IN RECENT YEARS many people have been disturbed at urban growth and its encroachment upon agricultural land. Some seem to have regarded the city as a sinister thing, reaching out to strangle and engulf the rural area and its people.

Hasn't much of this been exaggerated? In our view, it is not city growth, as such, that creates the problem, but population growth. Had the population growth of the last twenty or fifty years taken place in open country the area required for site purposes would have been far larger. If it is use of land we are concerned about, the city is far more efficient than the open country: the larger the city, the less land is required for a given population increase.

An agricultural revolution has taken place in the United States in the past forty years or so. If the total population today were 100 million, as it was at the end of the First World War, the area in crops would be *less* by at least 100 million acres. The growth of cities over the past generation has kept infinitely more land in agricultural production than it has taken out of it.

It seems probable that the area within cities and other urbanized areas will rise from about 16½ million acres in 1950 to between 30 million and 41 million acres in 1980, and between 41 million and 57 million acres by the year 2000. But it also seems probable, on the basis of present experience, that at least one-third of the land within city and urbanized area boundaries will be idle, though effectively withdrawn from purposes other than urban: from agriculture, forestry, and recreational uses, for instance. An unknown amount of land outside of urban boundaries also will be withdrawn.

It would be physically possible to accommodate most of the increase in urban land use on land now withdrawn from other uses and provide for much-needed recreation space into the bargain; but the process will take much greater public responsibility and imagination than we have had in the past. If we really wish to minimize the impact of the city upon the countryside, let us start with the most lavish land users among the cities —the smaller cities and towns. It is the smaller urban places that take up most of the land used or withdrawn by the cities, and yet their land-use problems have had almost no planning or policy attention.

Adapted from Land for the Future, *a new RFF study (see list below).*

NEW RFF STUDIES

Land for the Future, by Marion Clawson, R. Burnell Held, and Charles H. Stoddard
572 pages June 1960 $8.50

Regions, Resources, and Economic Growth, by Harvey S. Perloff, Richard F. Muth, Edgar S. Dunn, Jr., and Eric E. Lampard
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Copper Costs and Prices, 1870-1957, by Orris C. Herfindahl
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Science and Resources. Essays based on 1959 RFF Forum Lectures
256 pages November 1959 $5.00

Above books obtainable from booksellers or The Johns Hopkins Press, Baltimore 18, Md.

Sequence and Timing in River Basin Development, by John V. Krutilla
40 pages February 1960 Paper, 75c

Above book obtainable only from Resources for the Future, Inc.

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